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see that this is an inevitable and temporary phase, the rapids through which we must pass before we swing into a broader and deeper stream. The sooner we get people to see that, the better for everyone. Every effort to build up a permanent paid hospital staff and to organize the work of student nurses on an educational basis will make the change easier when it comes. From this point of view the shortage of nurses may be a help rather than a hindrance in the end.

Those of us who stand by the helm and see the good old ship through will have all the glory and satisfaction of being the pioneers of a new order. But we shall have to prepare a great many more of our promising younger women to take over some of the new responsibilities which are already presenting themselves in the new type of school. Unless we foresee these new adjustments and are ready for them, we may have to wait quite a while for our results. We cannot afford to fail. Remember Mr. Wells, "It is always a race between education and catastrophe," and let us prepare now in order that our new schools when they come shall be worthy of our past efforts and of the new opportunities which are ours.

APPLIED BACTERIOLOGY: SOME FACTS A NURSE SHOULD KNOW ABOUT THE WIDAL REACTION

BY A BACTERIOLOGIST

A LAW was recently passed in our state requiring registration of all nurses practicing as graduate nurses. It fell to my lot to examine the papers on Bacteriology. One examination included a question in regard to the Widal reaction. Two hundred women answered this question and in those answers I learned many new and startling things about the Widal test,—none of which are to be found in text-books.

Many specimens are sent to our diagnostic laboratory by physicians requesting the Widal reaction in cases in which the test has no value. I am not holding the nurses responsible for this, but it only points to the need of more knowledge in regard to the Widal test.

The Widal reaction is based upon the effect of immune bodies upon bacteria. The immunity apparatus of the human body produces many different kinds of immune bodies in the blood stream. We call them immune bodies because they immunize or neutralize injurious substances in the blood. For example, if diphtheria organisms throw toxin, or poison, into the blood, the immunity apparatus produces

antitoxin, or, if typhoid bacilli enter the blood, the immunity apparatus produces agglutinins which clump the typhoid bacilli. Hence, when we want to know if our patient has immune bodies in his blood, we collect some of his blood serum and add to it some live typhoid bacilli (hanging drop). By observing the mixture under the microscope we can see whether the typhoid bacilli continue to wriggle about (motility) or clump together (positive reaction).

If they clump, what caused them to clump? The answer is, The agglutinins, or immune bodies, in the blood serum of the patient caused them to clump. We then ask, How did the immune bodies get into the blood? Typhoid bacilli had been in the patient's blood and had caused the immunity apparatus to produce immune bodies. How did the typhoid bacilli get into the blood stream? The answer to the last question may vary with each individual case. Two ways in which typhoid bacilli may enter the blood stream, are: (1) The individual may have been vaccinated with typhoid vaccine, i. e., inoculated with several millions of dead typhoid bacilli, which produce immune bodies. That is the reason we take vaccine, because it produces immune bodies. So if we found a positive Widal reaction in a vaccinated person, we would not conclude that he had typhoid fever. In fact, we would not consider the Widal reaction of any diagnostic value in a vaccinated person. (2) The patient may have swallowed some typhoid bacilli with his food or water. (It is an interesting fact that in order to contract typhoid fever we have to eat typhoid bacilli.) We conclude then that a positive Widal reaction in an unvaccinated patient ill with a fever is of great diagnostic value.

If the typhoid bacilli do not clump (negative Widal reaction), we know there are no immune bodies in the blood stream. Does this mean that the person ill with fever is not ill with typhoid fever? It may, or may not, depending upon whether the immunity apparatus had had time to produce immune bodies after being attacked by typhoid bacilli. Scientific investigation and clinical observation have proven that it takes from 7-14 days after invasion of the organism for agglutinins to appear in the blood stream. Hence, we conclude a Widal reaction is of no value before the seventh day of disease.

Note: The author will be glad to answer any question submitted by nurses interested in the application of bacteriology to nursing.